WHAT IS CLAIMED IS:

1. A film-forming method comprising:

supplying into a plasma processing chamber at least three kinds of gases including a silicon compound gas, an oxidizing gas, and a rare gas, the percentage of the partial pressure of the rare gas (Pr) based on the total pressure being not smaller than 85%, i.e., $85\% \leqq Pr < 100\%$; and

generating a plasma within the plasma processing chamber so as to form a film of silicon oxide on a substrate to be processed.

2. A film-forming method comprising:

supplying into a plasma processing chamber at least three kinds of gases including a silicon compound gas, an oxidizing gas, and a hydrogen gas; and

generating a plasma within the plasma processing chamber so as to form a film of silicon oxide on a substrate to be processed.

3. The film-forming method according to claim 1, wherein the silicon compound gas includes at least one selected from the group consisting of a tetraethoxy silane gas, a tetramethyl cyclo-tetrasiloxane gas, a di-acetoxy di-tertiary butoxy silane gas, and a hexamethyl disiloxane gas, and the oxidizing gas includes at least one selected from the group consisting of an oxygen gas, an ozone gas, a carbon monoxide gas and a carbon dioxide gas.

4. The film-forming method according to claim 2, wherein the silicon compound gas includes at least one selected from the group consisting of a tetraethoxy silane gas, a tetramethyl cyclo-tetrasiloxane gas, a di-acetoxy di-tertiary butoxy silane gas, and a hexamethyl disiloxane gas, and the oxidizing gas includes at least one selected from the group consisting of an oxygen gas, an ozone gas, a carbon monoxide gas and a carbon dioxide gas.

5. The film-forming method according to claim 1, wherein the silicon compound gas is provided by a silane gas, and the oxidizing gas includes at least one selected from the group consisting of an oxygen gas and an ozone gas.

6. The film-forming method according to claim 2, wherein the silicon compound gas is provided by a silane gas, and the oxidizing gas includes at least one selected from the group consisting of an oxygen gas and an ozone gas.

7. A film-forming method comprising:

supplying into a plasma processing chamber at least three kinds of gases including an organometallic compound gas, an oxidizing gas, and a rare gas, the percentage of the partial pressure of the rare gas (Pr) based on the total pressure being not smaller than 85%, i.e., $85\% \leqq Pr < 100\%$; and

generating a plasma within the plasma processing

chamber so as to form a film of a silicon oxide and/or a metal oxide on a substrate to be processed.

8. A film-forming method comprising:

supplying into a plasma processing chamber at least three kinds of gases including an organometallic compound gas, an oxidizing gas, and a hydrogen gas; and

generating a plasma within the plasma processing chamber so as to form a film of a silicon oxide and/or a metal oxide on a substrate to be processed.

9. The film-forming method according to claim 7, wherein the organometallic compound gas is a gas of at least one compound selected from the group consisting of trimethyl aluminum, triethyl aluminum, tripropoxy zirconium, pentaethoxy tantalum, and tripropoxy hafnium.

10. The film-forming method according to claim 8, wherein the organometallic compound gas is at least one compound selected from the group consisting of trimethyl aluminum, triethyl aluminum, tripropoxy zirconium, pentaethoxy tantalum, and tripropoxy hafnium.

11. The film-forming method according to claim 1, wherein the plasma generated within the plasma processing chamber is a surface wave plasma.

12. The film-forming method according to claim 2, wherein the plasma generated within the plasma processing chamber is a surface wave plasma.

13. A semiconductor device, comprising a transistor including a gate insulating film formed of at least one selected from the group consisting of a silicon oxide film and a metal oxide film and formed by the film-forming method defined in claim 7.

14. A film-forming method, comprising:

supplying onto a substrate to be processed, a semiconductor layer being formed on at least a part of said substrate and said substrate being arranged within a plasma processing chamber, at least three kinds of gases including an organometallic compound gas, an oxidizing gas, and a rare gas such that the percentage of the partial pressure of the rare gas (Pr) based on the total pressure is not smaller than 85%, i.e., $85\% \leqq Pr < 100\%$; and

generating a plasma within the plasma processing chamber so as to laminate a metal oxide film on a silicon oxide layer.

15. A method of manufacturing a semiconductor device, comprising:

supplying into a plasma processing chamber, in which is arranged a substrate to be processed, a semiconductor layer being formed on the surface of at least a part thereof, at least three kinds of gases including an organometallic compound gas, an oxidizing gas, and a hydrogen gas; and

generating a plasma within the plasma processing

chamber so as to form a metal oxide film on a silicon oxide layer.

16. The method of manufacturing a semiconductor device according to claim 14, wherein the silicon oxide layer is formed in a thickness of at least 2 nm.

17. The method of manufacturing a semiconductor device according to claim 15, wherein the silicon oxide layer is formed in a thickness of at least 2 nm.

18. A display device, comprising a plurality of transistors acting as pixel selecting elements and arranged to form a matrix, each of the transistors including a gate insulating film formed of at least one selected from the group consisting of the silicon oxide film and the metal oxide film and formed by the film-forming method defined in claim 7.

19. A method of manufacturing a display device including a plurality of thin film transistors arranged to form a matrix on a substrate to be processed, a semiconductor layer being formed on the substrate to be processed, and the process for forming a gate insulating film included in each of the plural thin film transistors on the semiconductor layer comprising:

supplying into a plasma processing chamber, in which is arranged the substrate to be processed, at least three kinds of gases including an organometallic compound gas, an oxidizing gas, and a rare gas such that the percentage of the partial pressure of the rare

gas (Pr) based on the total pressure is not smaller than 85%, i.e., 85% ≦ Pr < 100%; and

generating a plasma within the plasma processing chamber so as to form a metal oxide film.

20. A method of manufacturing a display device including a plurality of thin film transistors arranged to form a matrix on a substrate to be processed, a semiconductor layer being formed on the substrate to be processed, and the process for forming a gate insulating film included in each of the plural thin film transistors on the semiconductor layer comprising:

supplying into a plasma processing chamber, in which is arranged the substrate to be processed, at least three kinds of gases including an organometallic compound gas, an oxidizing gas, and a hydrogen gas; and

generating a plasma within the plasma processing chamber so as to form a metal oxide film.

21. The method of manufacturing a display device according to claim 19, wherein the silicon oxide layer is formed in a thickness of at least 2 nm.

22. The method of manufacturing a display device according to claim 20, wherein the silicon oxide layer is formed in a thickness of at least 2 nm.